

Notice of Allowability	Application No.	Applicant(s)	
	10/671,876	SADIQ ET AL.	
	Examiner	Art Unit	
	JUSTIN M. PATS	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant's RCE of 4/1/10.
2. ☒ The allowed claim(s) is/are 15-18,20,21,25,26,31-34,36,37,39,40 and 49-52.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date ____ 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>9-9-10</u> . 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other ____. |
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/Beth V. Boswell/
Supervisory Patent Examiner, Art Unit 3623

DETAILED ACTION

Notice to Applicant

1. The following is an Examiner's Amendment and Reason's for Allowance following Applicant's filing of a Request for Continuation (RCE) on 3/17/10 and communications with Applicant Representative Atty. Ryan McCarthy, Reg. No. 50,636, dated 9/9/10 (*see* attached Interview Summary).

2. Of claims 15–18, 20–21, 25–26, 31–34, 36–37, 39–45, 47–54 pending as of 3/17/10, claims 15–18, 20–21, 25–26, 31–34, 36–37, 39–40, 49–52 are allowed as amended below.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/17/10 has been entered, in which Applicant amended claims 15, 31, and 41.

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Allowable Subject Matter

4. Claims 15–18, 20–21, 25–26, 31–34, 36–37, 39–40, 49–52 as amended below are allowed over the prior art as explained further below in the reasons for allowance.

EXAMINER'S AMENDMENT

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given via the telephone by Ryan McCarthy, Reg. No. 50,636 on 9/9/10.

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The application has been amended as follows:

In the Title

Please amend the title of the application as follows:

(Currently Amended) SYSTEM AND METHOD OF FLEXIBLE WORKFLOW
MANAGEMENT

In the Claims

Please amend claims 15–17, 20–21, 31–33, 36–37, and 49–52, and cancel claims 41–48, 53–54 of the application as follows:

15. (Currently Amended) A system for flexible workflow management, comprising:
an apparatus including a storage medium having code segments stored thereon for
execution of a workflow; ~~the code segments being operable to cause the apparatus to execute~~
~~components comprising:~~

a process modeling tool operable to create a workflow process model, the process model
including a configurable task set that includes a plurality of tasks and a plurality of constraints
that define relationships between the plurality of tasks, each constraint of the plurality of
constraints corresponding to a constraint type of a plurality of constraint types, wherein the
plurality of constraint types includes at least one structural constraint type and at least one
containment constraint type;

a constraints validation engine operable to:

simplify a specification of the plurality of constraints for each said constraint
~~based on~~ by resolving intra-constraint conflicts for each said constraint type to provide a
minimal specification for each said constraint of the constraint type, wherein for each
said constraint type, said constraints validation engine is operable to resolve said intra-
constraint conflicts by (1) examining the plurality of constraints for transitivity and
redundancies, (2) where possible, capturing any transitivity and removing any

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redundancies detected, and (3) employing a minimum cover algorithm when the constraint type is structural and a truth table algorithm when the constraint type is containment ~~simplifying the specification of the constraints being based on a redundancy or a transitivity within the constraint type;~~

resolve inter-constraint conflicts between each of the plurality of constraint types, taking into account any redundancies and/or transivities detected between the plurality of constraint types;

~~removing redundant constraints;~~ and

validate the plurality of tasks and the plurality of constraints such that each of the plurality of tasks are includable in at least one task subset without violating any of the plurality of constraints in each of the minimal specifications of the plurality of constraints; and

a workflow engine operable to ~~copy the process model to thereby~~ create an open instance by copying the process model, and further operable to activate the configurable task set during execution of the open instance, and to thereby compile and execute an instance template including a selected task subset of the plurality of tasks.

16. (Currently Amended) The system of claim 15 wherein the constraints validation engine is further operable to validate the instance template for conformance with the plurality of constraints.

17. (Currently Amended) The system of claim 15 wherein the workflow engine is operable to activate the configurable task set by outputting the plurality of tasks for display to a user, and is further operable to accept the selected task subset from the user.

20. (Currently Amended) The system of claim 15 wherein the plurality of constraints include a structural constraint that imposes a restriction on how tasks are included within the instance template.

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21. (Currently Amended) The system of claim 15 wherein the plurality of constraints include a containment constraint that specifies conditions under which tasks are included within the instance template.

31. (Currently Amended) A method of flexible workflow management ~~compiling and executing an instance template~~, comprising:

storing a configurable task set in a ~~computer readable~~ storage medium, the configurable task set including a plurality of tasks and a plurality of constraints that define relationships between the plurality of tasks, each constraint of the plurality of constraints corresponding to a constraint type of a plurality of constraint types, wherein the plurality of constraint types includes at least one structural constraint type and at least one containment constraint type;

~~reading the configurable task set from the computer readable storage medium;~~

creating a workflow process model using a process modeling tool, the process model including the configurable task set;

simplifying a specification of the plurality of constraints for each constraint, using a constraints validation engine, based on by resolving intra- constraint conflicts for each said constraint type to provide a minimal specification for each said constraint of the constraint type, wherein for each said constraint type, said resolving is performed by (1) examining the plurality of constraints for transivities and redundancies, (2) where possible, capturing any transivities and removing any redundancies detected, and (3) employing a minimum cover algorithm when the constraint type is structural and a truth table algorithm when the constraint type is containment ~~simplifying the specification of the constraints being based on a redundancy or a transitivity within the constraint type~~;

resolving inter-constraint conflicts between each of the plurality of constraint types, taking into account any redundancies and/or transivities detected between the plurality of constraint types; ~~removing redundant constraints~~;

validating the plurality of tasks and the plurality of constraints such that each of the plurality of tasks are includable in at least one task subset without violating any of the constraints in each of the minimal specifications of the constraints;

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~~creating an open instance by copying the process model using a workflow engine to~~
~~thereby create an open instance; and~~

activating the configurable task set during execution of the open instance to thereby compile and execute an instance template including a selected task subset of the plurality of tasks.

32. (Currently Amended) The method of claim 31 further comprising validating the instance template for conformance with the plurality of constraints.

33. (Currently Amended) The method of claim 31 further comprising:
activating the configurable task set by outputting the plurality of tasks for display to a user; and
accepting the selected task subset from the user.

36. (Currently Amended) The method of claim 31 wherein the plurality of constraints include a structural constraint that imposes a restriction on how tasks are included within the instance template.

37. (Currently Amended) The method of claim 31 wherein the plurality of constraints include a containment constraint that specifies conditions under which tasks are included within the instance template.

41–48. (Cancelled)

49. (Currently Amended) The system of claim 15 wherein the plurality of constraints include at least one of an inclusion constraint and an exclusion constraint, the inclusion constraint identifying a dependency between task subsets such that the inclusion of a particular task subset within the workflow requires the inclusion of another particular task subset within the workflow, the exclusion constraint identifying a dependency between task subsets such that the

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inclusion of a particular task subset within the a workflow requires the exclusion of another particular task subset within the workflow.

50. (Currently Amended) The system of claim 15 wherein the plurality of constraints include at least one of a minimum constraint and a maximum constraint, the minimum constraint imposing a minimum number of task subsets that must be included in a workflow, the maximum constraint imposing a maximum number of task subsets that can be included in the workflow.

51. (Currently Amended) The method of claim 31 wherein the plurality of constraints include at least one of an inclusion constraint and an exclusion constraint, the inclusion constraint identifying a dependency between task subsets such that the inclusion of a particular task subset within the workflow requires the inclusion of another particular task subset within the workflow, the exclusion constraint identifying a dependency between task subsets such that the inclusion of a particular task subset within the a workflow requires the exclusion of another particular task subset within the workflow.

52. (Currently Amended) The method of claim 31 wherein the plurality of constraints include at least one of a minimum constraint and a maximum constraint, the minimum constraint imposing a minimum number of task subsets that must be included in a workflow, the maximum constraint imposing a maximum number of task subsets that can be included in the workflow.

53–54. (Cancelled)

Reasons for Allowance

6. The following is an examiner's statement of reasons for allowance:

In the art of workflow management, the present invention is a system and method of flexible workflow management, comprising an apparatus including a storage medium with code for execution of a workflow; a process modeling tool for creating a workflow process model including a configurable task set that includes tasks and constraints that define relationships between the tasks, each constraint corresponding to one of a plurality of constraint types including at least one structural constraint and at least one containment constraint; a constraints validation engine for simplifying a specification of the constraints for each constraint by resolving intra-constraint conflicts to provide a minimal specification for each constraint, wherein for each constraint type, the constraints validation engine is for resolving said intra-constraint conflicts by (1) examining the constraints for transitivity and redundancies, (2) where possible, capturing any transitivity and remove any redundancies detected, and (3) employing a minimum cover algorithm when the constraint type is structural and a truth table algorithm when the constraint type is containment; resolving inter-constraint conflicts between each of the constraint types, taking into account any redundancies and/or transitivity detected between the constraint types; and validating the tasks and constraints such that each of the tasks are includable in a task subset without violating any of the constraints in each of the minimal specifications; and a workflow engine for creating an open instance by copying the process model, and further for activating the configurable task set during execution of the open instance,

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and for thereby compiling and executing an instance template including a selected task subset of the tasks.

The closest prior art is **Shazia Sadiq et al., *Pockets of Flexibility in Workflow Specification*, Proceedings of the 20th International Conference on Conceptual Modeling, Lecture Notes in Computer Science, 2224, pp. 513-526 (H.S. Kunii, et al., eds. 2001) [hereinafter Sadiq]**. Sadiq discloses a workflow analysis that divides workflow processes into dynamic, adaptive, and flexible processes. Sadiq lays out different types of constraints, including order, serial, fork, and synchronize, and executes an instance of the workflow, proceeding from open instance to an instance template.

Ribeiro et al., *Security Policy Consistency*, IST/INESC, Lisbon, Portugal, 30 Jun 2000, pg. 1–13 [hereinafter Ribeiro] discloses a constraint management system that comprises simplifying a specification of the constraints for each constraint corresponding to a constraint type of a plurality of constraint type; for each constraint based on resolving intra-constraint conflicts for each constraint type to provide a minimal specification for each constraint of the constraint type, simplifying the specification of the constraints being based on a redundancy or a transitivity within the constraint type; resolve inter-constraint conflicts between the constraint types, an apparatus comprising a computer readable medium, storage of data in the computer readable medium, and reading therefrom so as to cause the apparatus to execute the steps of the claimed invention, and at least one of an inclusion constraint and an exclusion constraint, the inclusion constraint identifying a dependency between task subsets such that the inclusion of a particular task subset within the workflow requires the inclusion of another particular task subset within the workflow, the exclusion constraint identifying a dependency between task subsets

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such that the inclusion of a particular task subset within the a workflow requires the exclusion of another particular task subset within the workflow

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Mangan and Sadiq, *On Building Workflow Models for Flexible Processes*, The Thirteenth Australasian Database Conference ADC2002, 28 January 2002, pg. 1–7
[hereinafter Mangan] teaches a method of constraint analysis within workflow models wherein the constraints include at least one of a minimum constraint and a maximum constraint, the minimum constraint imposing a minimum number of task subsets that must be included in a workflow, the maximum constraint imposing a maximum number of task subsets that can be included in the workflow.

Vijayan and Tsay, *Floorplanning by Topological Constraint Reduction*, IBM Research Division, IEEE 1990, pg. 106–109 [hereinafter Vijayan] discloses a method of removing both strong redundant and transitive redundant constraints in a floorplanning process.

Heydon et al., U.S. Pat. 6,081,268 [hereinafter Heydon] discloses a method for ignoring redundant constraints in a software program.

Flores et al., U.S. Pat. 5,734,837 [hereinafter Flores] discloses a method and apparatus for building workflow processes that follows principles of consistency including simplicity and avoiding redundancy.

Mangan and Sadiq, *A Constraint Specification Approach to Building Flexible Workflows*, J. Res. & Practice in IT, Vol. 35, No. 1, Feb 2003, pg. 21–39 [hereinafter Mangan and Sadiq] discloses a proposal to build workflow schemas from a standard set of modeling constructs and given process constraints, wherein the disclosure identifies fundamental requirements for the constraint specification and classifies constraints by selection, termination and build. The specification of these constraints in a relational model finally, the method dynamically builds a instance specific workflow models based on the constraints)

However, neither Sadiq, Ribeiro, Mangan, Vijayan, Heydon, Flores, nor Mangan and Sadiq, singularly or in combination, teach or fairly suggest, in the context of system and method of flexible workflow management that analyses both intra and inter constraint conflicts, the combination of: (1) *wherein the plurality of constraint types includes at least one structural constraint type and at least one containment constraint type*; and (2) *wherein for each said constraint type, said constraints validation engine is operable to resolve said intra-constraint conflicts by (or as recited by the method claims—wherein for each said constraint type, said resolving is performed by) (1) examining the plurality of constraints for transitivity and redundancies, (2) where possible, capturing any transitivity and remove any redundancies detected, and (3) employing a minimum cover algorithm when the constraint type is structural and a truth table algorithm when the constraint type is containment ; and (3) taking into account any redundancies and/or transitivity detected between the plurality of constraint types.*

Nor does the remaining prior art of record remedy the deficiencies found in Sadiq, Ribeiro, Mangan, Vijayan, Heydon, Flores, and Mangan and Sadiq. Furthermore, neither the

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prior art, the nature of the problem, nor knowledge of a person having ordinary skill in the art provides for any predictable or reasonable rationale to combine prior art teachings.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUSTIN M. PATS whose telephone number is (571)270-1363. The examiner can normally be reached on Monday through Friday, 8:00am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Beth Boswell can be reached on 571-272-6737. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Justin M Pats/
Examiner, Art Unit 3623

/Beth V. Boswell/
Supervisory Patent Examiner, Art Unit 3623